# APPENDIX C
## Design Standards for Streets and Utilities.

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# C.1. GENERAL PROVISIONS.

**C.1.1. Compliance.**

- Except as hereinafter provided, before any final plat of a subdivision shall be eligible for final approval, and before any street or utility shall be accepted for maintenance by the city, minimum improvements shall have been completed and approved in accordance with city engineering standards and specifications, or their completion shall have been guaranteed with an irrevocable letter of credit in accordance with Article 6 of this Ordinance.
- [(1)]All utility lines shall be underground.

**C.1.2. Intent of specifications.**

- The intent of the specifications set out in this Appendix C is to prescribe minimum requirements for storm drainage, water supply, sanitary sewerage, sidewalks and street improvements to be undertaken by the developer within the city or its extraterritorial jurisdiction. Satisfactory completion of these improvements, attested by approval of the city engineer will qualify streets in the city and utilities in the city or its extraterritorial jurisdiction to be accepted for maintenance by the city.

**C.1.3. Statement by owner.**

- The owner of land, or his authorized agent, shown on a subdivision plat submitted for approval by the City Council shall sign a statement on the plat stating whether or not any land shown thereon is within the subdivision regulation jurisdiction of the City of Kannapolis.

**C.1.4. Effect of plat approval on dedications.**

- Pursuant to General Statutes 160A-374, the approval of a plat shall not be deemed to constitute or effect the acceptance by the city or public of the dedication of any street or other ground, public utility line, or other public facility shown on the plat. However, the City Council may, by resolution, accept any dedication made to the public of lands or facilities for streets, parks, public utility lines, or other public purposes, when the lands or facilities are located within its subdivision regulation jurisdiction. Acceptance of dedication of lands or facilities located within the subdivision regulation jurisdiction but outside the corporate limits of the city shall not place on the city any duty to open, operate, repair, or maintain any street, utility line, or other land or facility, and the city shall in no event be held to answer in any civil action or proceeding for failure to open, repair, or maintain any street located outside its corporate limits.

**C.1.5. Abrogation.**

- It is not intended that this ordinance repeal, abrogate, annul, impair, or interfere with any existing easements, covenants, deed restrictions, agreements, rules, regulations, or permits previously adopted or issued pursuant to law. However, where this ordinance imposed greater restrictions, the provisions of this ordinance shall govern.

**C.1.6. Inspections of utilities.**

- The office of the city engineer shall be notified twenty-four (24) hours in advance of the work to be started so that an authorized representative of the city engineer may be assigned to make any and all necessary inspections of the work performed.
- The city engineer, or his representative, shall be allowed access to all parts of the work, and shall be furnished with every reasonable facility to ascertain whether or not the work is performed in accordance with the specifications.
- No material shall be placed nor any work performed except in the presence of the city engineer, or his authorized inspector, without special permission of the city engineer. Such inspections, however, shall not relieve the contractor from any obligation to perform all of the work strictly in accordance with the specifications.
- In case of any dispute arising as to the material furnished or the manner of performing the work, the



**(1) City Council approved 9/27/2004**

inspector shall have authority to reject materials or suspend work until the question at issue can be referred to and decided by the city engineer. The contractor shall remove any work or material condemned as unsatisfactory by the city engineer and shall rebuild and replace same to the standard required by the specifications, all at his own expense.

- The office of the city engineer will be responsible for all inspection.
- When conflicts occur between North Carolina State Highway Commission standards and the City of Kannapolis standards, the City of Kannapolis standard will apply.
- All contracts for the performance of work to construct required improvements must be approved by the city engineer.

**C.1.7. Improvements variance.**

- The city engineer may grant a variance from the terms of these improvements regulations when such variance will not be contrary to the public interest and where, because of the existence of unusual physical conditions, strict compliance with the provisions of this chapter would cause an unusual and unnecessary hardship on the subdivider. Such variance shall not be granted if it has the effect of nullifying the intent and purpose of these regulations. Furthermore, such variance shall not be granted by the city engineer unless and until:
- A written application for an improvements variance is submitted to the office of the city engineer on forms provided by that office demonstrating:
    1. That special conditions and circumstances exist which are peculiar to the land, structures or required subdivision improvements involved and which are not applicable to other lands, structures, or required subdivision improvements;
    2. That a literal interpretation of the provisions of these regulations would deprive the applicant of rights commonly enjoyed by other properties with similar conditions;
    3. That the special conditions and circumstances do not result from the actions of the applicant;
    4. That the granting of the variance requested will not confer on the applicant any special privilege that is denied by these regulations to other lands, structures, or required subdivision improvements under similar conditions. No existing conditions on neighboring lands which are contrary to these regulations shall be considered grounds for the issuance of a variance.
- The city engineer shall make findings that the requirements of this section have been met.
- The city engineer shall further make a finding that the reasons set forth in the application justify the granting of the variance that would make possible the reasonable use of the land, buildings, or other improvements.
- The city engineer shall make further finding that the granting of the variance would be in harmony with the general purpose and intent of these regulations, will not be injurious to the surrounding territory, or otherwise be detrimental to the public welfare.
- The city engineer shall make all findings required by this section within seven (7) days of the date of receipt of the written application.
- An appeal from the finding of the city engineer may be taken to the City Council by any person aggrieved. An appeal is taken by filing with the zoning administrator a written notice requesting a subdivision variance and specifying the grounds therefore, as set forth in Article 6 of this Ordinance.
- An appeal must be taken within seven (7) days after the date of the findings by the city engineer.
- The City Council may reverse or affirm (wholly or partly) or may modify the findings appealed from and shall make any order, requirements, decision or determination that in its opinion ought to be made in the case before it.

**C.1.8 [(1)]Sidewalk, Curb, and Gutter Exception.**

- The Planning Director, the City Engineer (or designee), the Public Works Director (or designee) and the Site Plan Review Coordinator, acting as the Sidewalk, Curb, and Gutter Committee, shall make recommendations to the City Manager, who may grant an exception from the sidewalk, curb, and gutter requirements if any of the following scenarios exists:



**(1) City Council approved 4/12/2004**

1. Where the topography on a numbered State highway or local City street does not allow for the reasonable or practical installation of sidewalks, curbs, and gutters; and/or
2. In instances where the NCDOT or City has not yet determined the ultimate right-of-way width for numbered State highways and/or local streets; and/or
3. Where the State highway and/or local street is identified in the *Kannapolis Sidewalk Plan* as a project to be built as part of a larger sidewalk/street improvement project included within the Capital Improvement Program (CIP). In such cases, an exception may be granted for the construction of the sidewalk; however, exceptions to curb and gutter would only be permitted if scenarios 1 and/or 2 above also exist.
4. **(1)**Projects located along a State road that are either funded and/or under study with NCDOT.
5. **(1)**Local streets or State roads that have not been identified by the State or City as an improvement or study project but that are deemed by the City Engineer and Public Works Director as possibly becoming a project or identified as being a street or road that may not warrant improvements to be installed at this time.
6. **(1)**Curb and gutter is not required for limited access and partial access highways nor is a payment in lieu of construction of curb and gutter required for frontal areas along such highways. Sidewalks would remain as a requirement along these highways.
7. **(1)**Curb and gutter is not required on projects located in watershed areas that allow additional density when these improvements are not installed. Sidewalks would remain as a requirement along these highways.

- Such an exception, if granted, would be subject to the following conditions:
  1. The developer would be required to pay a fee-in-lieu of the required installation.
  2. The fee would be calculated annually, based on actual costs for typical construction during the previous fiscal year at a rate of 110% to cover administrative costs and the cost of inflation, with the following exceptions:
     On streets identified in the *Kannapolis Sidewalk Plan* as requiring sidewalk on only one side of the street, the fee shall be calculated annually based on actual costs for typical construction during the previous fiscal year at a rate of 55% to cover administrative costs and the cost of inflation.
  3. The fee would be put into a Sidewalk, Curb, and Gutter Reserve Account administered by the City of Kannapolis.
  4. The Reserve Account would only be used for the construction of sidewalks, curbs, and gutters at locations within the same Sidewalk Maintenance Routes/ Zones as the project where the exception was granted. Funds collected may be used for the construction of a greenway if 1) a greenway, as proposed in the *Livable Communities Blueprint*, abuts the property to be developed, and/or 2) it is determined that a proposed greenway will more adequately serve pedestrian traffic and better meet the intent of the sidewalk requirement.
  5. Reserve Account funds will be expended within seven (7) years of the date collected.
  6. Exceptions may be granted for sidewalks, and/or curb & gutter by the City Manager except in scenarios specified above.
  7. Paying into the Reserve Account does not release a developer from providing any required rights-of-way and/or easement dedications.
- Should a developer not agree to all of the above conditions, all sidewalks, curbs and gutters associated with development must be installed per the current requirements of this Ordinance.
- This exception may only be applied to existing public streets.
- A written application for a sidewalk, curb, and gutter exception shall be submitted to the Planning Department demonstrating:
  1. That the project meets one or more of the above stated scenarios.
  2. That the developer agrees to all of the above stated conditions.
- The Sidewalk, Curb, and Gutter Committee shall make findings as to whether the requirements of this section have been met and that the reasons set forth in the application justify the granting of the exception.
- The Committee shall present such findings to the City Manager with seven (7) days of the receipt of the written application.



**(1) City Council approved 9/26/2005**

- The City Manager shall make a decision regarding the matter within seven (7) days of the receipt of the Committee's recommendations.
- An appeal from the findings of the City Manager may be taken to the Board of Adjustment by any person aggrieved. An appeal is taken by filing with the Administrator an application for an Appeal from a Final Order, Decision, or Interpretation.
- An appeal must be submitted within seven (7) days after the date of the findings by the City Manager.
- The Board of Adjustment may reverse or affirm (wholly or partly) or may modify the findings appealed from and shall make any order, requirements, decision or determination that in its opinion ought to be made in the case before it.

# C.2. WATER AND SEWER IMPROVEMENT STANDARDS.

**C.2.1. General Standards.**

- Design standards and specifications for water and/or sewer improvements shall conform to the most current adopted version of the City of Kannapolis Water and Sewer Policy. A copy of the Policy is available at the office of the Administrator or the office of the Public Works Director.

# C.3. FIRE PROTECTION.

**C.3.1. Fire Hydrants.**

- Applicants shall install fire hydrants in accordance with Kannapolis [(1)]Fire Department specifications and requirements.
- The Kannapolis Public Works Department may contract with a developer to install fire hydrants as required, but in all cases, the full cost of providing for such hydrants shall be borne by the developer
- Any hydrant connected to the Kannapolis water system constructed pursuant this subsection, shall constitute dedication to the Kannapolis Public Works Department of such hydrant.
- All newly installed fire hydrants shall be 5-1/4 inch barrel hydrants. All foot valves shall be 5-1/4 inch in diameter. Only three-way hydrants shall be installed with steamer connections. All hydrants shall be delivered with a primer coat. After hydrant installation, the primer shall be touched up and then painted [(1)]red with reflective top (2 coats).
- **Hydrant Spacing.** All newly installed fire hydrants shall be spaced at [(1)]800-foot intervals in residential zoning districts, except as provided herein. In Commercial, Industrial and Multi-family construction developments, hydrants shall be spaced at [(1)]400-foot intervals. No application for development approval shall be approved for any building unless a hydrant is installed within 400 feet of the most remote area of the building. Structures having sprinkler systems may provide yard hydrants to meet this requirement. Mains shall be sized to provide 500 gpm exterior hose streams.
  - **Testing and Acceptance.** All newly installed fire hydrants shall be tested by the Kannapolis Fire Department, or the fire department in whose jurisdiction it is located. The water authority shall notify the Kannapolis Fire Department, upon completion of the system and its availability for testing. No construction shall be allowed in the protected area until the water system has been tested and approved unless otherwise allowed by the authority having jurisdiction.[(1)]

**C.3.2. Fire Protection Facilities.**

- **Connections**. Connections for fire protection systems shall be made in compliance with the City of Kannapolis Backflow Prevention and Cross-Connection Control Policy. Fire protection water facilities installed upon the owner's private property are for the use of the owner, and Kannapolis Public Works Department assumes no responsibility for such facilities. No water service, other than fire protection, will be taken from water mains intended to provide fire protection only. Metering may be required of systems that are run periodically for testing with the water going to waste. Notification of testing shall be given a minimum of 48 hours prior to testing. Violation of this notification may require the installation of approved metering devices and appurtenances as specified by the City of Kannapolis Public works Department. The Kannapolis Public Works Department reserves the right to make necessary inspections to ensure compliance with these regulations. No pumps may be directly connected to the Kannapolis system.
- **Cold Water Meters – Fire Service Type Size 6", 8" AND 12"**. All meters shall fully comply with the AWWA specification C-703-79. Fire service meters shall consist of a combination of main line meter of the proportional type, having an unobstructed waterway of essentially the full pipe size for measuring high rates of flow, and a by-pass meter of appropriate size for measuring low rates of flow. The meter shall have an automatic valve mechanism for diverting low rates of flow through the by-pass meter. Meters must be approved by the National Fire Protection Association and listed by the Underwriters Laboratories. Loss inhead not to exceed for (4) psi.
- **Casing**. Main casing shall be either of copper alloy containing not less than seventy-five percent (75%) copper or of cast iron protected by a corrosion resistant coating or other anti-corrosion treatment. Main-case connections shall be flanged. Flanges shall be of the round type, faced and drilled, and shall conform to ANSI B16.1, Class 125. Companion flanges are not required.
- **Registers**. Registers shall be straight reading type and shall read in cubic feet. Registers will be provided with a center-sweep test hand. Registers will be perma-sealed.
- **Automatic Valves**. The automatic valve shall be of a type suitable for the purpose. It shall close by force. The weight of the valve and any supplemental force imposed on it shall offer sufficient resistance to the



**(1) City Council approved 2/23/2004**

incoming water to diver all small flows through the by-pass meter until such time as the rate of flow through the meter is great enough to ensure efficient operation of the main measuring section. Test plugs must be comparable to meter size.

- **Test Outlet**. A minimum 2 inch outlet shall be provided on the downstream side of the meter.
- **Piping Sizes.**
  - 3/4" - 2" piping shall be brass.
  - 3" - 10" piping shall be ductile iron (cement lined).

**C.3.3. Fire Service Requirements.**

- **Requirements in Residential Zoning Districts.** The minimum size of fire service water mains in residential developments shall be 6 inches. All 6 inch mains must be looped. Dead end mains shall be 8 inches or greater. Exceptions: Mains installed may meet minimum performance specifications for the expected demand upon the system. Mains shall be designed to provide the following flow rates at 20 psi:
  - RE and RL zoning: 1,000 gpm
  - RM-1, RM-2, RV, and RC zoning: [(1)]1,000 gpm
- **Requirements in Non-Residential Zoning Districts.** The minimum size of fire service water mains in commercial and multi-family dwelling areas shall be 8 inches. All 8-inch mains shall be looped. Dead end mains shall be 12 inches. The minimum size of fire service water mains in industrial areas shall be 12 inches. All 12-inch mains shall be looped. Dead end mains shall provide the minimum fire flow as required in this subsection. Notwithstanding the foregoing, mains installed may meet minimum performance specifications for the expected demand upon the system in lieu of the minimum size requirement. Mains shall be designed to provide the following flows at 20 psi:
  - AG zoning: 1,000 gpm
  - B-1 and O-I zoning: 1,750 gpm
  - C-1, C-2, CD and I-1 zoning: 2,000 gpm
  - I-2 zoning: 2,500 gpm
  - All other districts: 1,500 gpm
- Individual large structures with life safety hazards or extra hazardous operations shall, where required, by provided with on-site hydrants and water mains designed to provide the required fire flow as determined by the ISO formula and the Kannapolis Fire Department.



**(1) City Council approved 2/23/2004**

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# C.4. PUBLIC STREETS.

### C.4.1. Street Classification.

| Street Type | Description | ADT* |
|---|---|---|
| **Freeway/ Expressway** | Highway system serving travel, having characteristics of substantial statewide or interstate travel and exist solely to serve traffic | 8,000 |
| **Major Thoroughfare** | Streets that provide for expeditious movement of high volumes of traffic within and through urban streets | 8,000 |
| **Minor Thoroughfare** | Streets that perform the function of collecting traffic from local access roads/streets and carrying it to the major thoroughfare. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property. | 4,000 |
| **Major Collector** | A road that serves intra-county travel corridors and traffic generators and provides access to the Freeway/Expressway system. | 3,000 |
| **Minor Collector** | A road that provides service to small local communities and traffic generators and provides access to the Major Collector system. | 1,000 |
| **Local Street** | A local street serves to provide access to adjacent land, over relatively short distances. | 250 |
| **Alley** | An alley provides access to adjacent land, typically to the rear of parcels. Alleys are typically used for utilities, garbage service and garage access in residential areas. | 100 |

*Refers to the minimum Average Daily Traffic (ADT) typically experienced by a given Street Classification.

**Design Standards for the various Classes of Streets are listed below:**

| Characteristic | Expressway or Thoroughfare | Collector | Local | Alley |
|---|---|---|---|---|
| Maximum Grade | See Thoroughfare Plan | 6% level<br>9% rolling<br>12% hilly<br>5% within 100 feet of an intersection | 0.5% min. grade<br>12% max.<br>9% level<br>12% rolling<br>5% within 100 feet of an intersection | 12% max. |
| Minimum Horizontal Centerline Curve Radius | See Thoroughfare Plan | 230 feet | 150 feet | 90 feet |
| Minimum Tangent Between Reverse Curves | See Thoroughfare Plan | 200 feet | 100 feet | 0 |
| Minimum Intersection Corner Radius | See Thoroughfare Plan | 30 feet | 30 feet, except that a 15' radius may be used with a 25' toe. | 35 feet |
| Typical Design Speed | See Thoroughfare Plan | 25-35 mph | 25-35 mph | 15 mph |

Sources: Thoroughfare Plan; North Carolina Division of Highways, *Subdivision Roads, Minimum Construction Standards* (Jan. 1, 1999 or most current version as amended)

### C.4.2 Construction Standards and Specifications for Street, Sidewalks and Storm Drainage

#### C.4.2.1. Purpose.

- Intent of these specifications is to prescribe minimum requirements for streets, sidewalks and storm drainage within the governing limits of the City of Kannapolis. Detail drawings and standards cross-sections are illustrated in Section C.7.
- Satisfactory completion of these improvements, attested by approval of the city engineer will qualify streets in the city to be accepted for maintenance by the city. Additional information is available in the design standards of the subdivision regulations.

#### C.4.2.2. Grading.

- Grading: All streets shall be graded to their full right-of-way width or to a minimum of fifty (50) feet. Finished grade, cross-section and profile of the roadway shall be designed by a professional engineer or registered land surveyor and approved by the city engineer
- Longitudinal grades shall have a minimum grade of 0.5 percent (0.5%) and a maximum grade of twelve (12) percent.
- Transverse grade or crown shall be one-fourth (1/4) inch to one (1) foot slope. The maximum slope for cuts shall be two (2) to one (1) and for fill embankments, two (2) to one (1). Fill embankments shall be formed of suitable materials placed in successive layers of not more than six (6) inches in depth for the full width of the cross section, including width of slope area. No stumps, trees, brush, rubbish or other unsuitable materials or substances shall be placed in the embankments within any right-of-way or easement. Each successive six-inch layer shall be thoroughly compacted by a sheepsfoot roller, ten-ton, three-wheel power roller, pneumatic-tired roller or other method approved by the city engineer. Embankments over and around all pipes and culverts shall be of select material, placed and thoroughly tamped and compacted as directed by the city engineer or his representative. Any soft spots or rolling areas must be removed and replaced in the manner stated above until satisfactory compaction is achieved.

#### C.4.2.3. Cul-de-sac Streets.

- Cul-de-sacs shall be subject to the same design guidelines as local roads, above, except as modified herein.
- In no event shall more than twenty (20) equivalent residential units (ERUs) take access from a cul-de-sac. ERUs are determined in Article 14. Temporary cul-de-sacs on stub streets are exempted from this limitation.
- The preliminary and final site plan shall show a stub connecting the cul-de-sac to adjoining areas or parcels where future roadways are delineated in the Thoroughfare Plan or Collector Street Plan, or on a recorded subdivision or site plan (provided reasonable connection can be achieved without the need for a bridge or other feature to negate substantial differences in topography). The stub shall be improved as a pedestrian walkway, trail, or bikeway.
- The radius for the circular terminus, or turnaround, shall be not less than 40 feet. An island may be planted in the center of the turnaround in accordance with the standards as set forth in the Section C.7 of this Appendix C. The island shall maintain a minimum of 10 foot radius.
- In no event shall the cul-de-sac exceed the lengths set forth below:

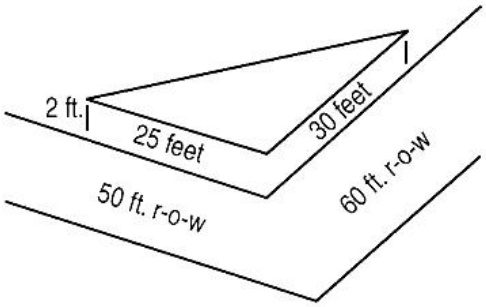
| District | Length (feet) |
|---|---|
| AG, RE, RL | 1,000 feet |
| RM-1, RM-2, RV | 800 feet |
| RC | 300 feet |
| B-1, O-I, C-1, C-2 | 500 feet |
| CD, I-1, I-2 | 1,500 feet |
| CC | 300 feet |
| PUD | 500 feet |

- Cul-de-sac length shall be measured from the first point of intersection with an existing street or the street providing access for the cul-de-sac.

**C.4.2.4. Sight Triangles.**

- A Sight Triangle shall be maintained on each corner of property at the intersection of two streets, a street and an alley, a street and a railroad, and also at the point where driveways, private drives, or entrances to common parking areas intersect with a public or private street right-of-way. The Sight Triangle is a triangular area connecting the following points: The intersection of the right-of-way lines and the end points of the sight distance for the intersecting streets as set forth in the North Carolina Department of Transportation, Subdivision Roads - Minimum Construction Standards (July 1, 1985), G.2 and Figures 3 and 4.
- In the event that a proposed new street connection is located on a site near an adjoining property not under the ownership of the developer, the City shall have the authority to acquire right-of-way (as set forth in NCGS 40-A) on the adjoining property for such area as necessary to establish a sight triangle.
- The following are the distances used to establish a sight triangle as measured from an intersecting right-of-way:

| Right of Way width | Distance (feet) |
|---|---|
| 50’ | 25’ |
| 60’ | 30’ |
| 70’ | 35’ |
| 80’ | 40’ |
| 90’ | 45’ |
| 100’ (or greater) | 50’ |




- **Illustration of a typical sight triangle.**

- A Sight Triangle shall contain no fence, structure, earth bank, hedge, planting, wall or other obstruction between a height greater than two (2) feet above the property line grade as established by the city engineer. The following are exempted from this provision:
  - Public utility poles.
  - Trees trimmed (to the trunk) to a height at least nine (9) feet above the level of the intersection.
  - Other plant species of open growth habit that are not planted in the form of a hedge and which are so planted and trimmed as to leave in all seasons a clear and unobstructed cross-view.
  - A supporting member or appurtenance to a permanent building lawfully existing on the effective date of this ordinance.
  - Official warning signs or signals.
  - Signs which conform to the Sign Ordinance (Article 12) mounted ten (10) feet or more above the ground with supports that do not encroach on the clear-vision area.
- The Administrator (or his/her designee) may waive this provision where the natural contour of the ground is such that there can be no cross visibility at the intersection.
- The requirements for Sight Triangles shall not apply in the CC District.

**C.4.2.5. Roadway and Curb and gutter Design.**

- All new streets shall have concrete curbs and gutters constructed to City of Kannapolis standards. Concrete drive entrances shall be built as shown in this Appendix. Standard, vertical curb and gutter shall be used. Valley gutter shall be prohibited. Curb and gutter shall be provided along any street that provides access to the subdivision or non-subdivision development site, except that this requirement shall not apply to partially or fully controlled access highways not designed for a curb and gutter system. [(2)]See Section **C.1.8 Sidewalk, Curb, and Gutter Exception** regarding additional exemptions.

**C.4.2.6. Curve Radius.**

- Property lines at the intersection of minor streets shall be rounded with a minimum radius and a maximum radius as follows:

| Underlying Zoning District | Minimum Radius | Maximum Radius |
|---|---|---|
| AG, RE | 30 feet | n/a |
| RL, RM-1, RM-2 | 30 feet | n/a |
| RV, RC, B-1, O-I, CC, PUD | 30 feet | 45 feet |
| C-1, C-2, CD, I-1, I-2, PUD | 30 feet | n/a |

**C.4.2.7. Roadway Base.**

- The material for base course shall be crusher-run stone with aggregate ranging from one and one-half (1/2) inches to dust. The material shall consist of tough durable aggregate, containing sufficient fines to insure a well and uniformly bonded base after compaction. The aggregate shall be free from an excess of flat, elongated, soft disintegrated pieces, and shall not contain clay, silt, vegetable or other objectionable matter. The base shall not be less than that required by city standards. The mixing and shaping of the base course material shall be done with a power driven motor grader, equipped with a blade not less than ten (10) feet long, and of a size equal to a 212 Caterpillar. [See standard drawing(s) in Section C.7]
- The base shall be compacted by rolling with ring or temping roller and with pneumatic tired roller. When completed, the base course shall be smooth, hard, dense, unyielding and well bonded.
- Materials shall conform to the requirements of the State Highway Specifications, Section 401. Construction methods shall conform to Section 51. [See standard drawing(s) in Section C.7]

**C.4.2.8. Roadway Surface.**

- Plant mix asphalt shall conform in all respects to State Highway Specifications, Section 140 (Type "I-2"), and in addition, the following special provisions will be used:
  - At least fifty (50) percent of the fine aggregate (material passing the No. 10 sieve) used in the mix shall consist of natural sand or approved screenings. The prime coat shall be applied only when the base course is dry. The surface course shall not be less than that required by city standards.

**C.4.2.9. Sidewalks.**

- Sidewalks shall be provided for the safe movement of pedestrians, separate from the movement of vehicular traffic, through residential areas, as well as to commercial, industrial and public places. [(1)]Except in the I-1 and I-2 zoning districts, sidewalks shall be constructed along both sides of all new streets in a subdivision and along any street that provides access to the subdivision or non-subdivision development site, provided the street providing access has existing curb and gutter or curb and gutter is required to also be installed.
- [(3)]See Section **C.1.8 Sidewalk, Curb, and Gutter Exception** regarding additional exemptions.



**(1) City Council approved 4/28/2003**

**(2) City Council approved 4/12/2004**

**(3) City Council approved 9/26/2005**

- Sidewalks shall:
- have a minimum of five (5) feet in width;
- be constructed of not less than three thousand (3,000) PSI concrete;
- be a minimum four (4) inches thick, except that where a sidewalk crosses a driveway, it shall be six (6) inches thick.; and
- shall be constructed on an adequately compacted and properly graded base
- shall have a lateral slope of one-quarter (1/4) inch per foot toward the street.
- shall be steel trowelled and light broom finished and cured properly. Tooled joints shall be provided at intervals of not more than five (5) feet and expansion joints at intervals of not more than forty (40) feet.

**C.4.2.10. Drainage System Requirements.**

- A drainage system shall be provided for by means of culverts under roadways and other drainage structures or outlet ditches that are necessary to provide adequate drainage of storm water for all streets in the subdivisions and for adjoining property where necessary. All such drainage systems shall be designed in accordance with sizes and specifications established in this Appendix C for Municipal Streets and the North Carolina Department of Transportation for State maintained roads.
- Storm drainage systems shall be designed by a professional engineer or landscape architect according to specifications of the public utilities department of the City of Kannapolis and approved by the city engineer. Installation of same shall be in accordance with city specifications and standards.
- Adequate storm drainage shall be provided throughout by means of pipes or graded channels; storm drain pipe shall be placed at all low points in the street grade to transmit storm water transversely across the street with catch basins being constructed on both sides of the street at the low points. In no case, shall storm water be transmitted more than five hundred (500) feet in the gutter line. No open ditches will be permitted within the limits of the street rights-of-way except for pre-existing stream channels which may be approved by the city engineer.
- The minimum size pipe shall be fifteen (15) inches, regardless of drainage area. The minimum cover for all pipe shall be two (2) feet. Subdrainage shall be provided where ground water table is within two (2) feet of the subgrade. Six-inch corrugated black plastic pipe or corrugated metal pipe with open joints or perforations laid on six (6) inches of clean sand or washed stone, covered with six (6) inches of clean sand or washed stone shall be used to lower water table. Ditches shall be minimum of thirty-six (36) inches deep and two (2) feet in width.
- All surface drainage pipe shall be concrete conforming to state Highway Commission Standard Specification of Road and Structures. For special conditions, pipe recommended by the manufacturer for the type installation involved, and approved by city engineer will be considered. Any concrete pipe laid between the concrete curbs shall be reinforced. All pipe shall be laid with the bell or groove upgrade and joint entirely interlocking.
- Catch basins shall be built as shown on the standard drawings. Improvised grates will not be acceptable. Catch basins walls shall be built straight with inside joints struck smooth. Precast catch basins may be acceptable with the approval of the city engineer.

**C.4.2.11. Sign Installation.**

- **Standard street signs installed by the City of Kannapolis.** In all subdivisions which include public streets, except as provided for in below, standard street signs shall be installed by the City of Kannapolis. The developer shall reimburse the city for full costs of installation. Installation, maintenance and replacement shall be the responsibility of the city.
- **Custom street signs installed by the developer.** In nonresidential subdivisions with architectural standards, restrictive covenants, and a property owner's association, custom street signs may be installed by the developer with all costs of installation, maintenance and replacement paid by the developer and as set forth below.

  - Such street signs shall comply with the Manual on Uniform Traffic Control Devices published by the U.S. Department of Transportation and may be installed only after written approval by the City Director of Streets and Traffic Engineering. Submission requirements for consideration of custom street signs shall include detailed color drawings, plans and specifications of the proposed street signs and a written statement describing funding for installation, maintenance and replacement.
- Replacement of lost or damaged regulatory or warning signs, as defined by the Uniform Manual, shall be accomplished immediately by the city using standard street signs until the developer or property owner's association installs replacement custom street signs. If the developer or property owner's association fails to install replacement custom street signs for regulatory and warning signs within ninety (90) days, the replacement by the city shall be considered permanent and full costs shall be paid by the developer or property owner's association. Replacement of lost or damaged guide signs, as defined by the Uniform Manual, shall be accomplished by the developer or property owner's association within ninety (90) days or the city shall install standard street signs with full costs paid by the developer or property owner's association.

**C.4.2.12. Street Intersections.**

- Insofar as practical, streets shall intersect at an angle of ninety (90) degrees for a minimum of fifty (50) feet from the roadway intersection. In no case shall the angle be less than sixty-five (65) degrees. Intersections having more than four (4) corners shall be prohibited.
- Proposed streets which intersect opposite sides of another street (either existing or proposed) shall be laid out to intersect directly opposite each other. Intersections which cannot be aligned shall be separated by a minimum length of 200 feet between survey center lines.
- Property lines at intersections shall be established so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle.

**C.4.2.13. Median and Islands.**

**(1)**Where an entrance road median or island is desired, a median of not less than the designated width shall be provided and shall be landscaped at a density equivalent to a Class "A" buffer as set forth in the Landscaping Standards of this Ordinance. **(1)**Islands and medians shall be a minimum of 75 square feet in size. Structures, permanent materials or plantings within the island shall not obscure the visibility of cars entering a cross street for a distance of 20 feet back from the curb face of the cross street, unless a larger setback is needed due to inadequate sight distance created by horizontal or vertical curve alignment. **(1)**Medians and/or islands shall be designed in accordance with Figure 12 "Recommended Road Connection with Interior Island" and "Detail Section View of Interior Island and Marker of the Minimum Construction Standards/ Subdivision Roads, Division of Highways, NCDOT, June 1999 (or most current edition).

**C.4.2.14. Unopened dedicated streets.**

- Streets for which right-of-way has been dedicated by subdivision plat or deed to the North Carolina Department of Transportation or the City of Kannapolis recorded with the Cabarrus or Rowan County Register of Deeds, but which have never been constructed, shall not be constructed or maintained by the city until the following conditions have been met:
  - Right-of-way shall be dedicated, and surveyed if necessary, sufficiently wide for the street and utilities, as determined by the city engineer.
  - Right-of-way shall be cleared and graded to meet city standards for slope and drainage.
  - Roadway shall be improved with a surface of crusher-run stone to a depth of not less than six (6) inches, two (2) inches of HB binder, and one and one-half (1½) inches of I-2 asphalt. Width of roadway shall be not less than eighteen (18) feet.
  - The city engineer or his authorized representative shall inspect all work.
  - The city engineer or his authorized representative shall issue a certificate of completion for the required improvements.



**(1) City Council approved 6/24/2002**

**C.4.2.15. Street names.**

- Proposed street names shall not duplicate nor too closely approximate phonetically the name of any street within the city and Cabarrus or Rowan County. Where proposed streets are extensions of existing streets, the existing street names shall be used except where a new name can reasonably be used to facilitate proper house numbering or to avoid further street name duplication.
- In addition to names to identify new streets, the following classifications shall apply:
  - North-south streets shall be designated as avenues;
  - East-west streets shall be designated as streets;
  - Streets changing direction shall be designated as drives, lanes or roads;
  - Streets changing direction which form a loop connected at both ends of the same street may also be designated as circles; and
- Cul-de-sacs or streets terminating in a similar dead-end shall be designated as courts if oriented east-west or places if oriented north-south.

# C.5. STORMWATER MANAGEMENT.

**C.5.1. General Requirements.**

- A storm water drainage plan shall be required to provide for the proper drainage of surface water. The storm water drainage plan shall be designed in accordance with Section 9.3 Standards of this Ordinance and as indicated below, so that adjacent properties are not unreasonably burdened with surface waters as a result of the development of the subdivision. No surface water shall be channeled or directed into a sanitary sewer. The storm water drainage plan shall be approved by the Public Works Director.

**C.5.2. Storm Water Drainage Plan.**

- A storm water drainage plan submitted for approval under these provisions shall include, but shall not be limited to the following information:
  - A site plan showing existing and proposed buildings, existing utilities, storm water drainage facilities, soil types, and ground cover.
  - Site construction plans, grading plans, existing and proposed topography, existing and flow patterns, and existing and proposed drainage system receiving runoff from the parcel.
  - Drainage plan design date.
  - Drainage area map and hydrologic engineering calculations including offsite drainage effecting the property.
  - Projected area of impervious cover and total land area.
  - Proposed land use and development plans.
  - A written description of the methodology used to analyze the pre- and post- development runoff with supporting calculations and documentations.
- A storm water drainage plan submitted for approval under these provisions shall be prepared by a professional engineer or landscape architect in accordance with the standards of this Ordinance and approved by the Public Works Director or his designee.
- If a public storm drainage system is reasonably accessible to the subdivision either by being within or by adjoining its boundaries, the subdivider or developer shall connect with such storm drainage system and shall do all grading and ditching, and shall provide and install all piping, appurtenances and drainage structures deemed necessary by the Public Works Director or his designee to properly carry surface water to the storm drainage system. If the city determines that future development may require the use of the proposed storm drainage system that will require larger storm drainage structures than proposed, the city will pay the difference of cost between the proposed storm drainage system materials and the materials required for conveying stormwater flow from future development.
- If a storm drainage system is not reasonably accessible to the subdivision, the subdivider shall do all grading and ditching, provide and install all piping, appurtenances and structures that are necessary to properly carry the surface water to locations within the boundaries of the subdivision which are acceptable to the Public Works Director or his designee.
- In areas specifically designated as sensitive water quality areas, [for example, within watershed protection overly districts as shown on the Official Zoning Map (UDO 4.16), within the River/Stream Overlay District (RSOD)(UDO 4.15), or other applicable Overlay Districts (UDO Article 4)] the more stringent design criteria applies.
- The Public Works Director or his designee may waive the requirements for a drainage plan if the land to be developed is part of a larger tract which has received prior subdivision or development approval, and has implemented, an overall stormwater drainage plan under the provisions of this section, so long as run-off from the property to be subdivided will not exceed the capacity of facilities constructed under the previously approved stormwater drainage plan.

**C.5.3. Design Criteria.**

- General design and construction criteria for detention facilities:
  - Design and installation of all storm water detention or other impoundment facilities shall comply

with applicable federal, state and local laws.

- In no case, shall a habitable structure be located within the impoundment area of any storm water detention facility or over a storm water drainage line.
- No utilities (sanitary sewer lines, underground power lines, water lines, etc.) shall be located within any impoundment facility.
- No structures may be located over storm drain lines.
- Impoundment facilities located within automobile parking areas shall not exceed a maximum water depth of ten (10) inches.
- All impoundment facilities will be considered permanent.

**C.5.4. Specific design and construction criteria for detention facilities:**

- Impoundment facilities located within automobile parking areas shall not exceed a maximum water depth of six (6) inches in code-required parking areas, ten (10) inches in additional parking area, and fifteen (15) inches in truck storage and loading areas.
- The following hydrologic soil groups shall apply for Cabarrus County, North Carolina:

| Series Name | Hydrologic Group | Series Name | Hydrologic Group |
|---|---|---|---|
| Altavista | C | Hewassee | B |
| Appling | B | Iredell | C/D |
| Armenia | D | Kirksey | C |
| Badin | C | Mecklenburg | C |
| Cecil | B | Misenheimer | C |
| Chewacla | C | Pacolet | B |
| Coronaca | B | Poindexter | B |
| Cullen | C | Sedgefield | C |
| Enon | C | Tatum | C |
| Georgevill | B | Vance | C |
| Goldston | C | Wehadkee | D |
| Herndon | B | | |

Source: United States Department of Agriculture, Soil Conservation Service, *Soil Survey of Cabarrus County, North Carolina*, Table 16. Page 86 and pages 124-126 of the *Soil Survey of Cabarrus County, North Carolina* shows permeability ratings by depth and type for each soil type.

- Stormwater detention or impoundment facilities shall be located on the site from which the run-off to be controlled is generated; provided, however, that off-site impoundment facilities are acceptable provided the land area involved within the facility is delineated on an acceptable map and officially recorded by the Cabarrus or Rowan County Register of Deeds as a permanent "drainage detention easement." Regional detention facilities are allowed if approved by the Public Works Director or his designee and if the development plans provide for the proper operation, inspection, and maintenance of the facilities in perpetuity through a restrictive covenant or other legal, enforceable mechanism.

# C.6. RESERVED.

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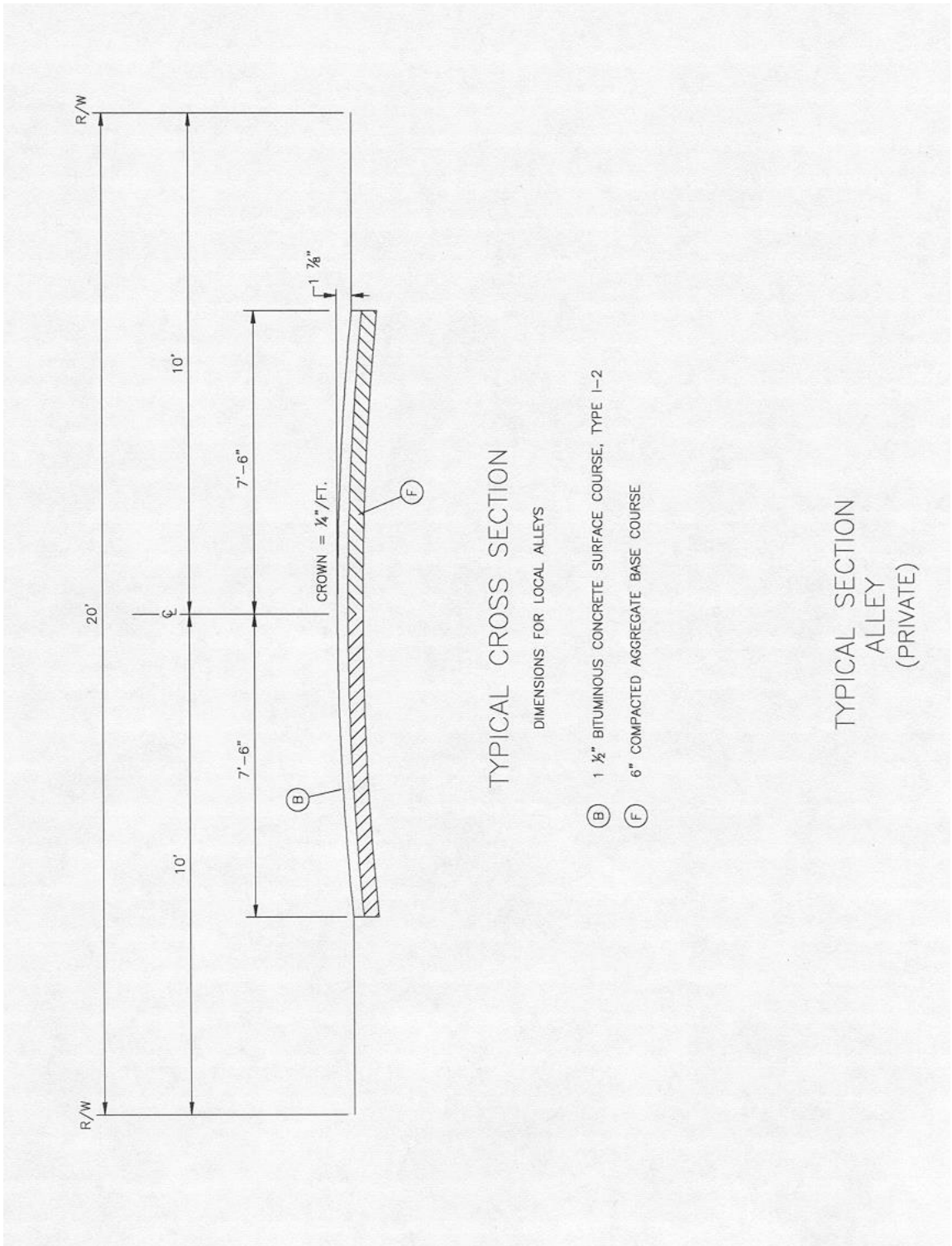
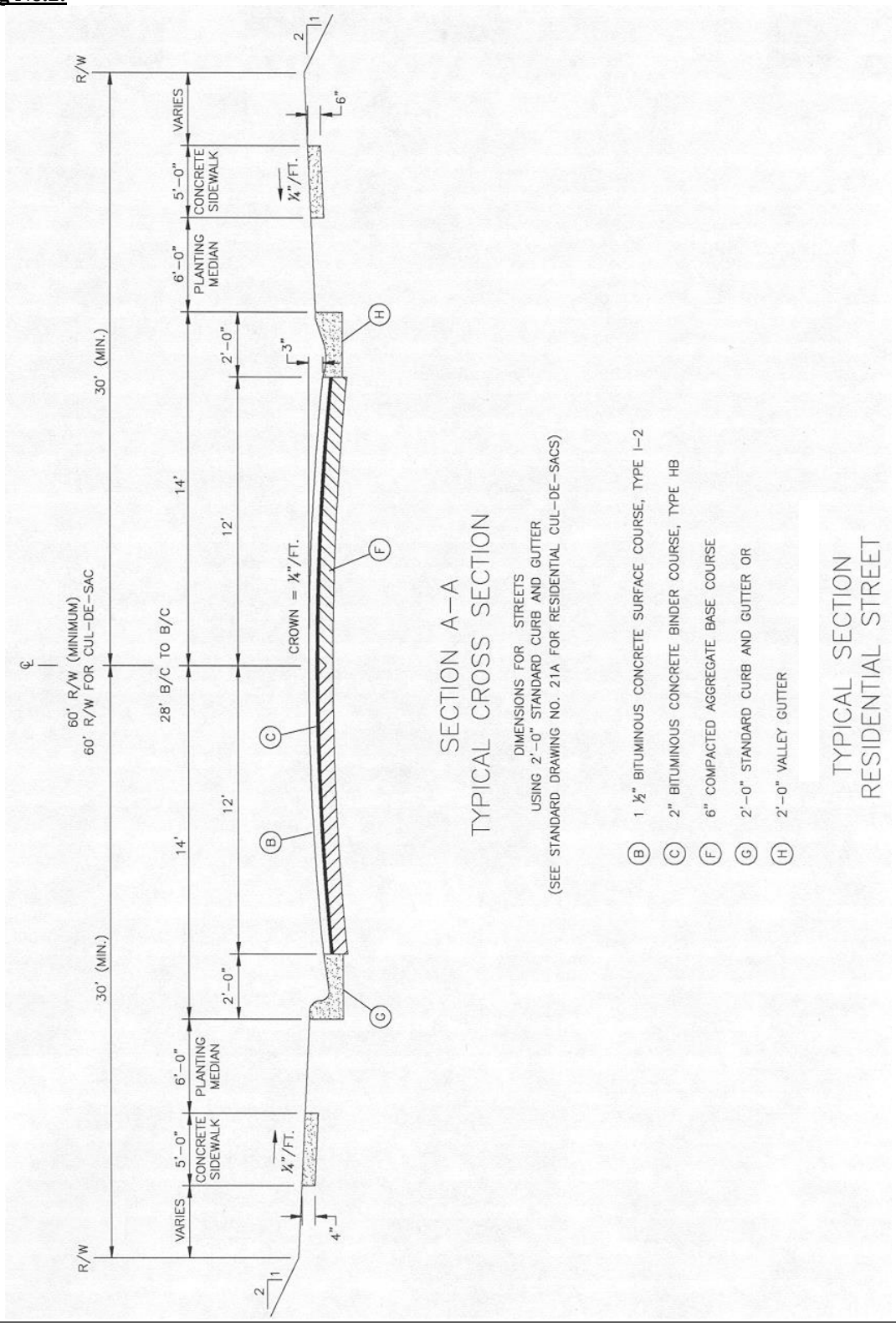
# C.7. STANDARD DETAILS AND CROSS-SECTION DRAWINGS.

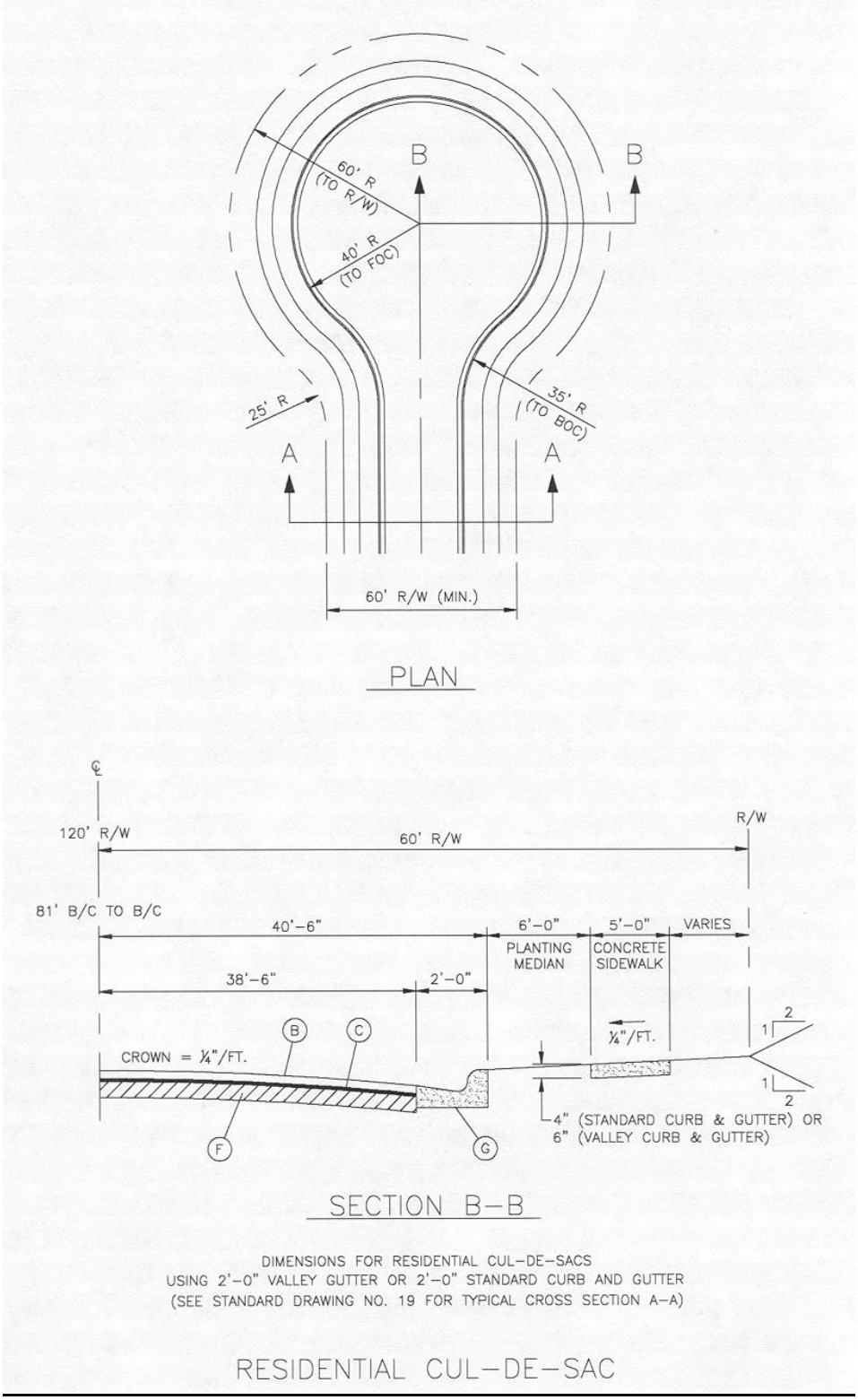
**Drawing No. 1:**


R/W
20'
10'
10'
7'-6"
7'-6"
℄
CROWN = ¼"/FT.
1 ⅞"
B
F
TYPICAL CROSS SECTION
DIMENSIONS FOR LOCAL ALLEYS
B 1 ½" BITUMINOUS CONCRETE SURFACE COURSE, TYPE I-2
F 6" COMPACTED AGGREGATE BASE COURSE
TYPICAL SECTION
ALLEY
(PRIVATE)

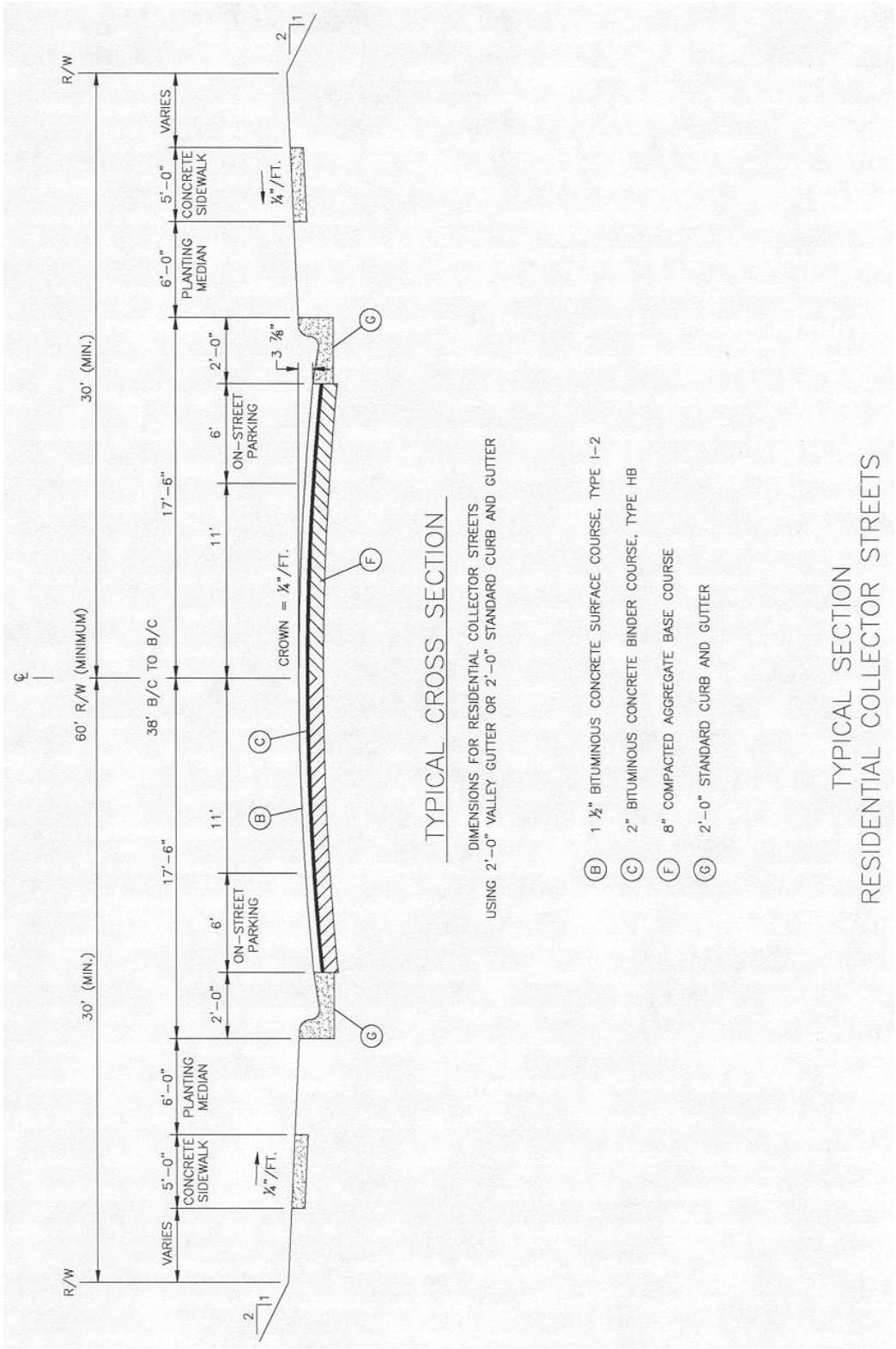
**Drawing No.2:**


R/W
VARIES
5'-0"
CONCRETE SIDEWALK
6'-0"
PLANTING MEDIAN
2'-0"
14'
12'
12'
14'
2'-0"
6'-0"
PLANTING MEDIAN
5'-0"
CONCRETE SIDEWALK
VARIES
R/W
30' (MIN.)
60' R/W (MINIMUM)
60' R/W FOR CUL-DE-SAC
28' B/C TO B/C
30' (MIN.)
CROWN = ¼"/FT.
¼"/FT.
¼"/FT.
4"
6"
3"
2
1
2
1
Ⓑ
Ⓒ
Ⓕ
Ⓖ
Ⓗ
SECTION A-A
TYPICAL CROSS SECTION
DIMENSIONS FOR STREETS
USING 2'-0" STANDARD CURB AND GUTTER
(SEE STANDARD DRAWING NO. 21A FOR RESIDENTIAL CUL-DE-SACS)
Ⓑ 1 ½" BITUMINOUS CONCRETE SURFACE COURSE, TYPE I-2
Ⓒ 2" BITUMINOUS CONCRETE BINDER COURSE, TYPE HB
Ⓕ 6" COMPACTED AGGREGATE BASE COURSE
Ⓖ 2'-0" STANDARD CURB AND GUTTER OR
Ⓗ 2'-0" VALLEY GUTTER
TYPICAL SECTION
RESIDENTIAL STREET

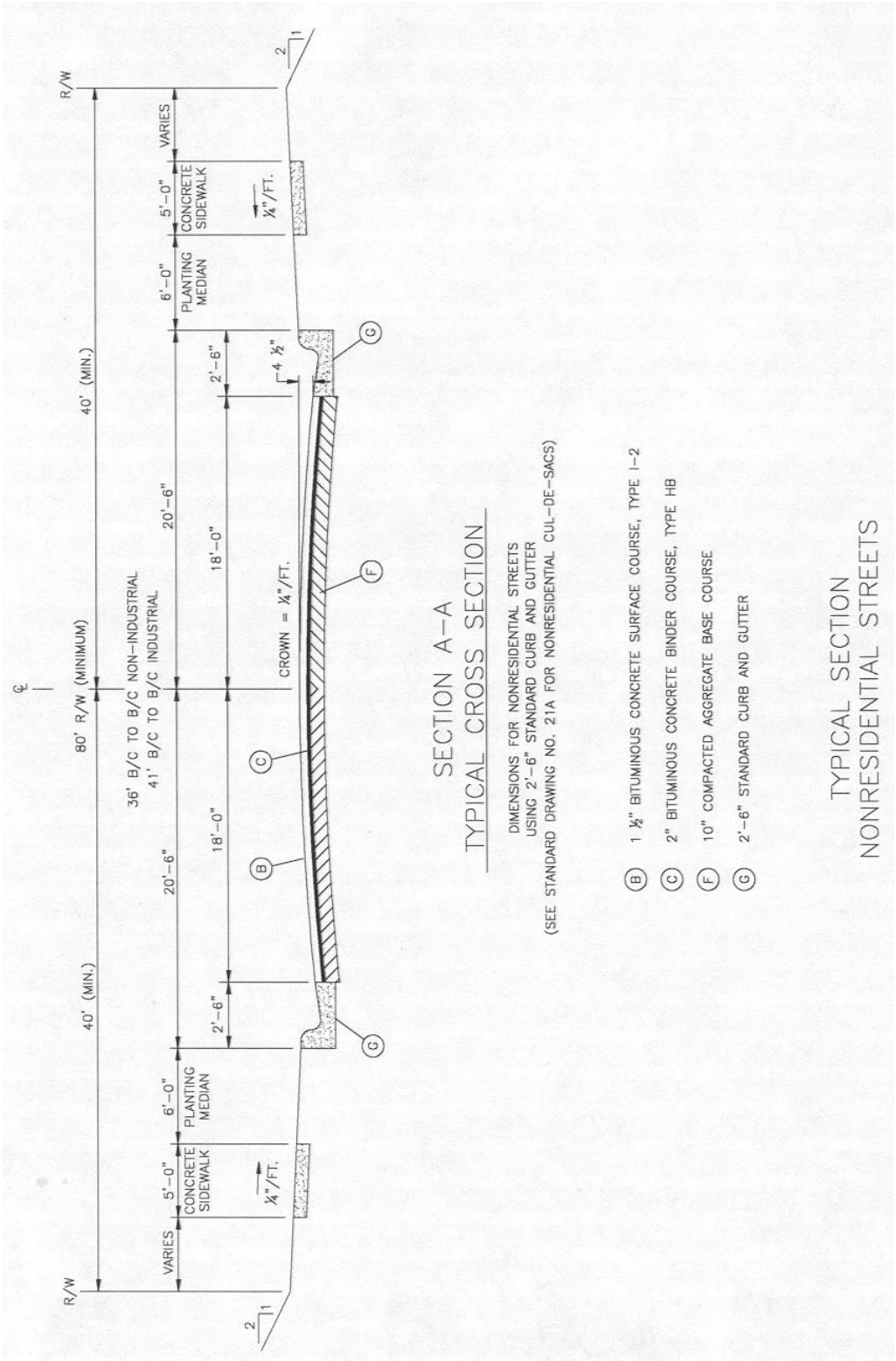
**Drawing No. 3:**


B
B
60' R
(TO R/W)
40' R
(TO FOC)
25' R
35' R
(TO BOC)
A
A
60' R/W (MIN.)
PLAN
℄
120' R/W
60' R/W
R/W
81' B/C TO B/C
40'-6"
6'-0"
5'-0"
VARIES
PLANTING
MEDIAN
CONCRETE
SIDEWALK
38'-6"
2'-0"
B
C
CROWN = ¼"/FT.
¼"/FT.
2
1
1
2
F
G
4" (STANDARD CURB & GUTTER) OR
6" (VALLEY CURB & GUTTER)
SECTION B-B
DIMENSIONS FOR RESIDENTIAL CUL-DE-SACS
USING 2'-0" VALLEY GUTTER OR 2'-0" STANDARD CURB AND GUTTER
(SEE STANDARD DRAWING NO. 19 FOR TYPICAL CROSS SECTION A-A)
RESIDENTIAL CUL-DE-SAC

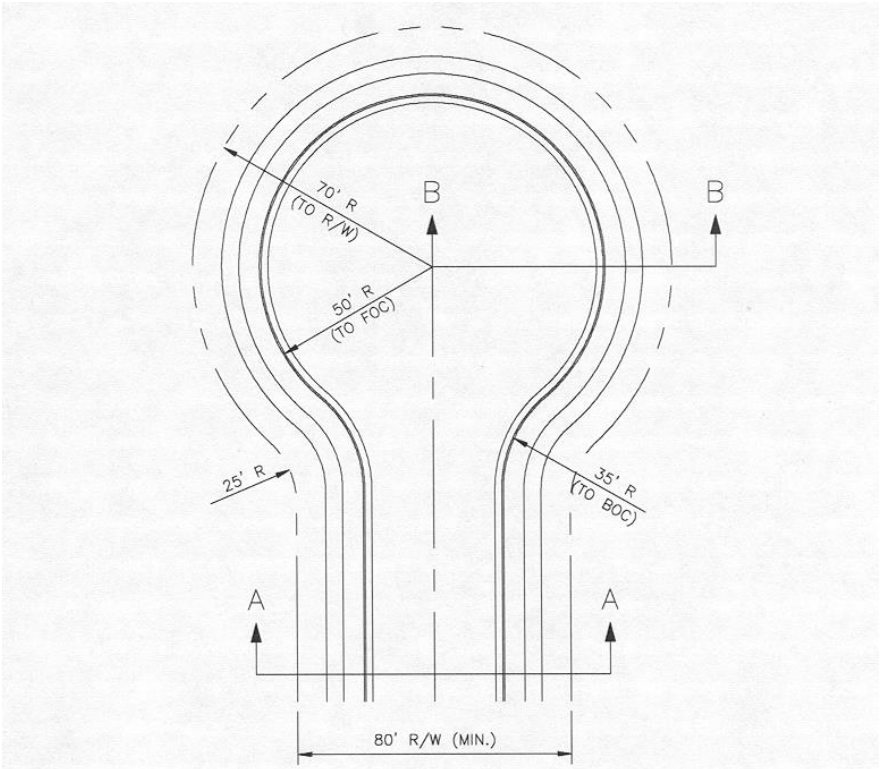
**Drawing No.4:**


TYPICAL CROSS SECTION
DIMENSIONS FOR RESIDENTIAL COLLECTOR STREETS
USING 2'-0" VALLEY GUTTER OR 2'-0" STANDARD CURB AND GUTTER
(B) 1 ½" BITUMINOUS CONCRETE SURFACE COURSE, TYPE I-2
(C) 2" BITUMINOUS CONCRETE BINDER COURSE, TYPE HB
(F) 8" COMPACTED AGGREGATE BASE COURSE
(G) 2'-0" STANDARD CURB AND GUTTER
TYPICAL SECTION
RESIDENTIAL COLLECTOR STREETS
R/W
30' (MIN.)
60' R/W (MINIMUM)
38' B/C TO B/C
VARIES
5'-0"
CONCRETE SIDEWALK
¼"/FT.
6'-0"
PLANTING MEDIAN
2'-0"
6'
ON-STREET PARKING
11'
17'-6"
CROWN = ¼"/FT.
3 ⅛"
2
1

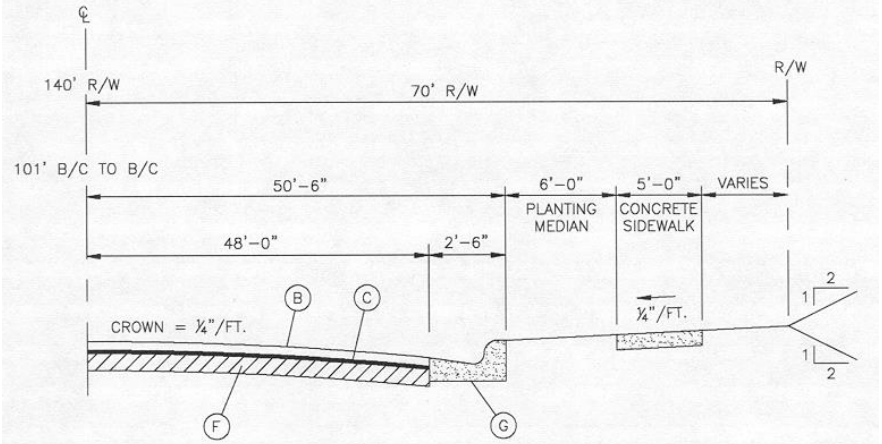
**Drawing No. 5:**


TYPICAL SECTION
NONRESIDENTIAL STREETS
SECTION A–A
TYPICAL CROSS SECTION
DIMENSIONS FOR NONRESIDENTIAL STREETS
USING 2'–6" STANDARD CURB AND GUTTER
(SEE STANDARD DRAWING NO. 21A FOR NONRESIDENTIAL CUL–DE–SACS)
(B) 1 ½" BITUMINOUS CONCRETE SURFACE COURSE, TYPE I–2
(C) 2" BITUMINOUS CONCRETE BINDER COURSE, TYPE HB
(F) 10" COMPACTED AGGREGATE BASE COURSE
(G) 2'–6" STANDARD CURB AND GUTTER
80' R/W (MINIMUM)
40' (MIN.)
36' B/C TO B/C NON–INDUSTRIAL
41' B/C TO B/C INDUSTRIAL
20'–6"
18'–0"
2'–6"
6'–0"
PLANTING MEDIAN
5'–0"
CONCRETE SIDEWALK
VARIES
¼"/FT.
CROWN = ¼"/FT.
4 ½"
R/W
2
1

**Drawing No. 6:**




PLAN

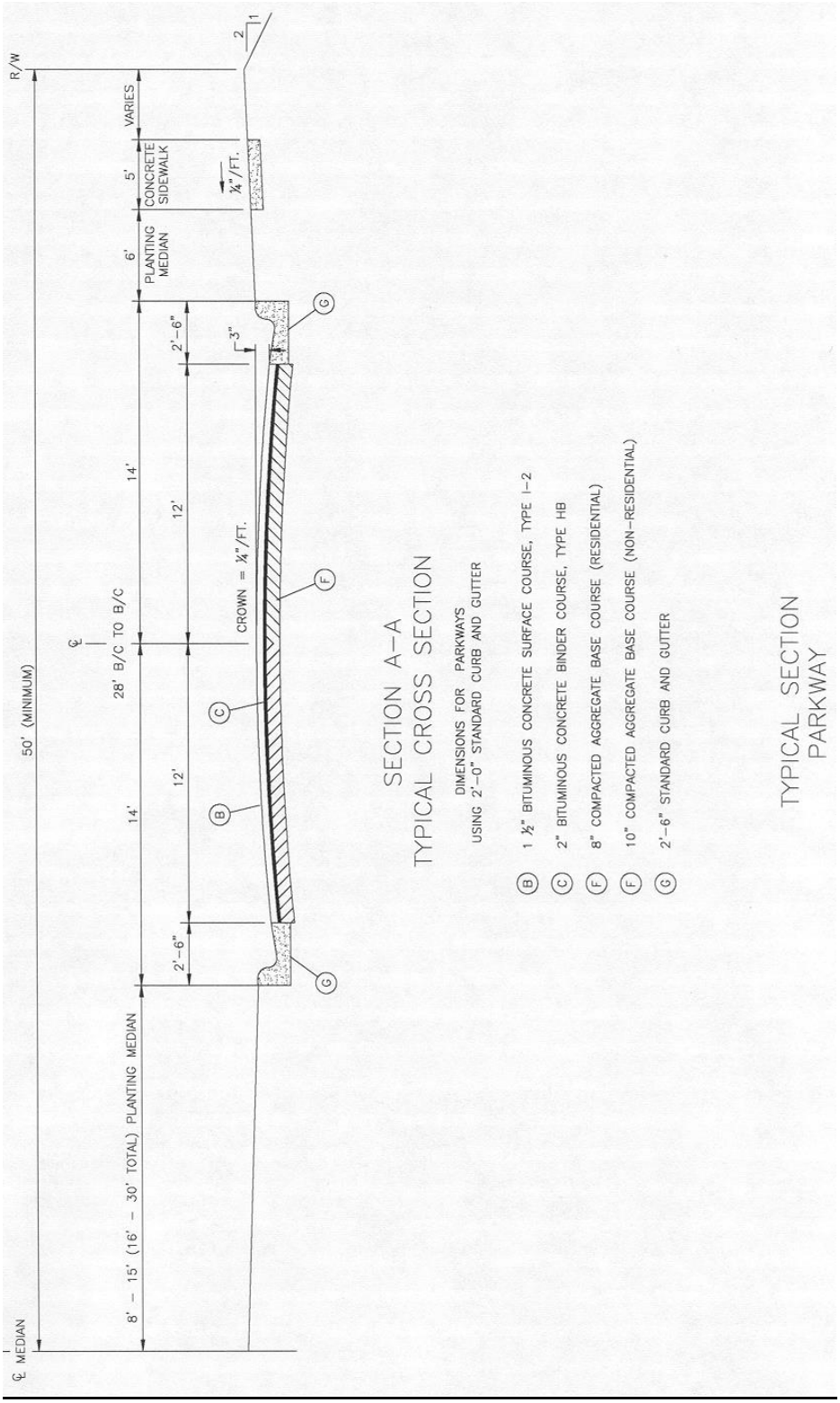



SECTION B–B

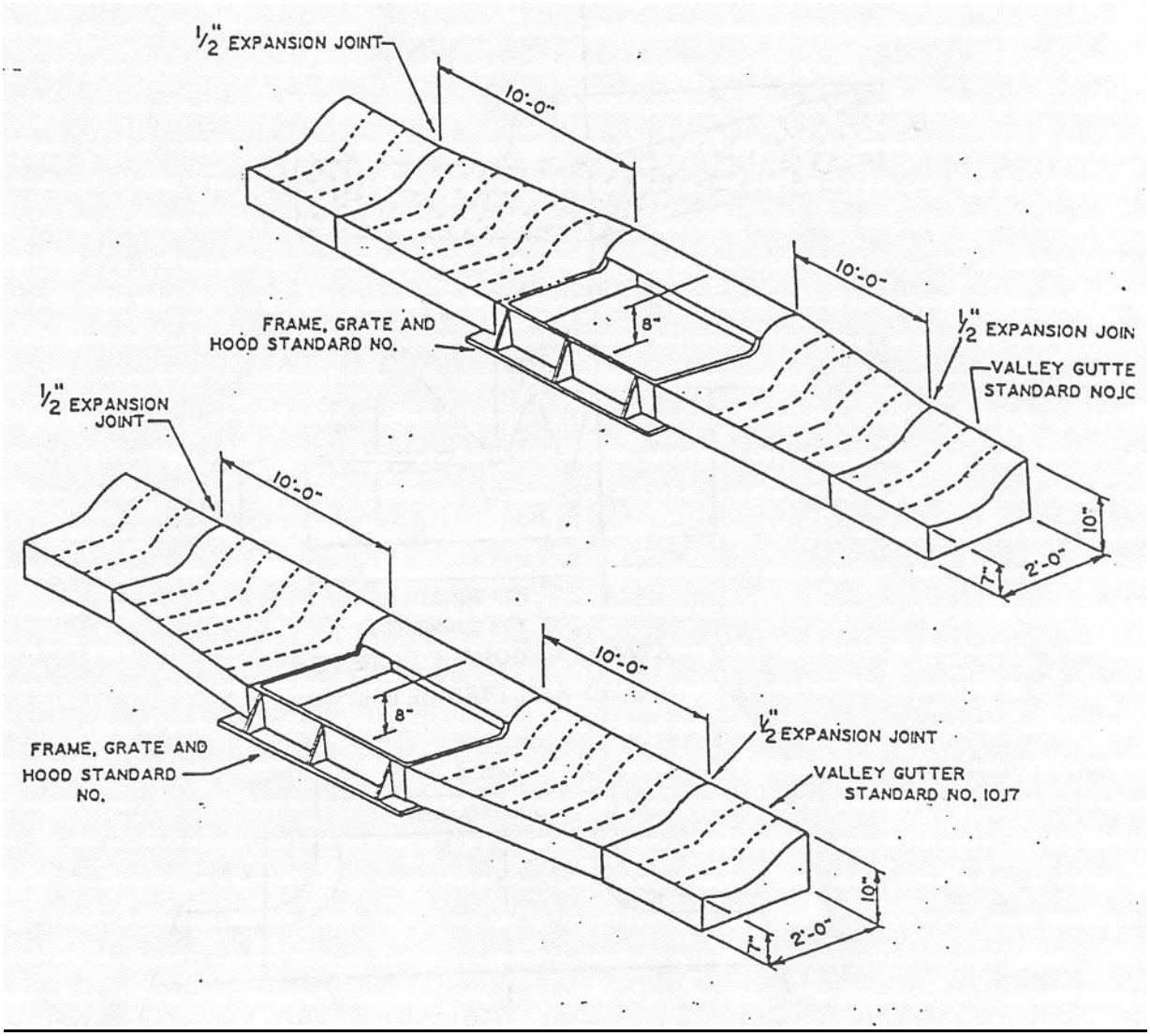
DIMENSIONS FOR NONRESIDENTIAL CUL–DE–SACS
USING 2'–6" STANDARD CURB AND GUTTER
(SEE STANDARD DRAWING NO. 21 FOR TYPICAL CROSS SECTION A–A)

NONRESIDENTIAL CUL–DE–SACS

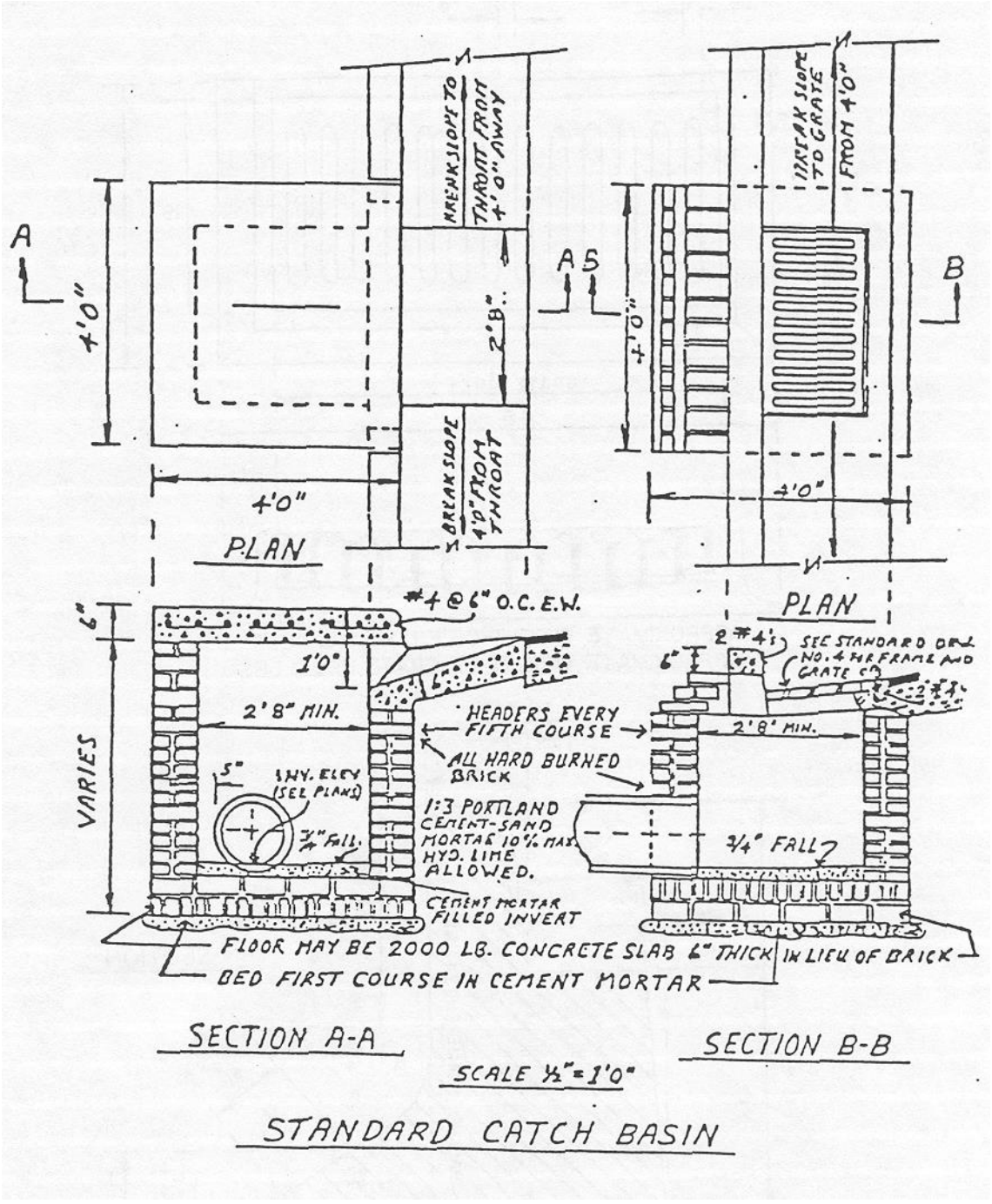
**Drawing No. 7:**


R/W
50' (MINIMUM)
℄ MEDIAN
8' – 15' (16' – 30' TOTAL) PLANTING MEDIAN
14'
12'
℄
28' B/C TO B/C
12'
14'
2'–6"
2'–6"
CROWN = ¼"/FT.
3"
6' PLANTING MEDIAN
5' CONCRETE SIDEWALK
VARIES
¼"/FT.
2
1
B
C
F
G
SECTION A–A
TYPICAL CROSS SECTION
DIMENSIONS FOR PARKWAYS
USING 2'–0" STANDARD CURB AND GUTTER
B 1 ½" BITUMINOUS CONCRETE SURFACE COURSE, TYPE I–2
C 2" BITUMINOUS CONCRETE BINDER COURSE, TYPE HB
F 8" COMPACTED AGGREGATE BASE COURSE (RESIDENTIAL)
F 10" COMPACTED AGGREGATE BASE COURSE (NON–RESIDENTIAL)
G 2'–6" STANDARD CURB AND GUTTER
TYPICAL SECTION
PARKWAY

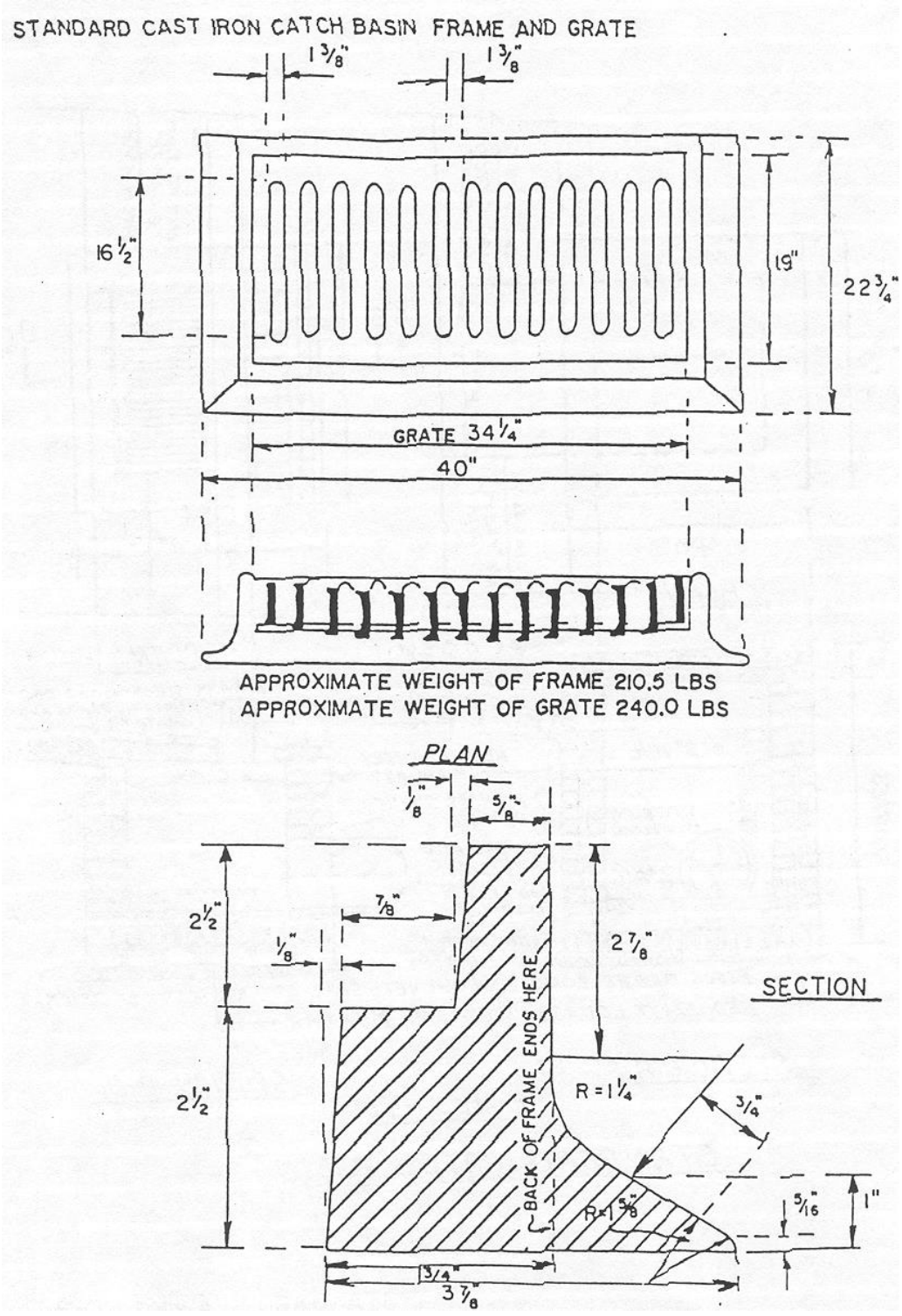
**Drawing No. 8:**


½" EXPANSION JOINT
10'-0"
10'-0"
FRAME, GRATE AND HOOD STANDARD NO.
8"
½" EXPANSION JOIN
VALLEY GUTTE STANDARD NOJC
½" EXPANSION JOINT
10'-0"
10"
2'-0"
10'-0"
8"
½" EXPANSION JOINT
FRAME, GRATE AND HOOD STANDARD NO.
VALLEY GUTTER STANDARD NO. 10J7
10"
2'-0"

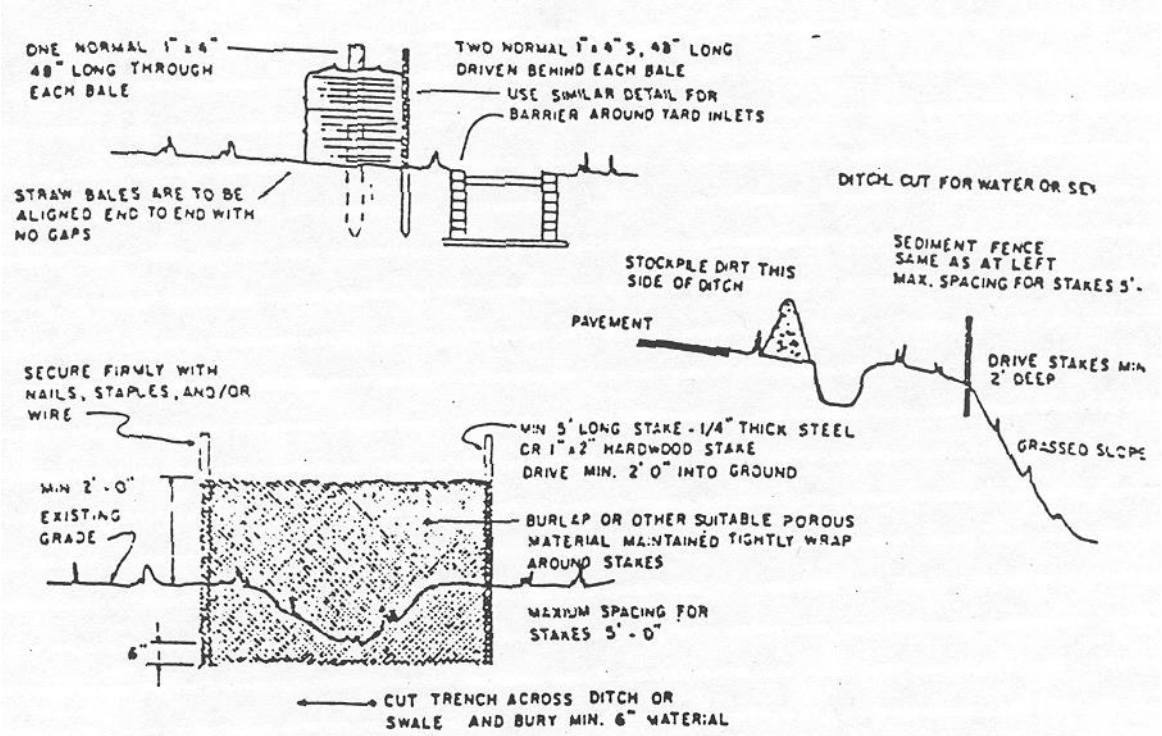
**Drawing No. 9:**


A
4'0"
BREAK SLOPE TO THROAT 4'0" AWAY
2'8"
BREAK SLOPE 4'0" FROM THROAT
4'0"
PLAN
A
B
BREAK SLOPE TO GRATE FROM 4'0"
4'0"
PLAN
#4 @ 6" O.C. E.W.
6"
1'0"
2'8" MIN.
VARIES
5"
INV. ELEV (SEE PLANS)
3/4" FALL
HEADERS EVERY FIFTH COURSE
ALL HARD BURNED BRICK
1:3 PORTLAND CEMENT-SAND MORTAR 10% MAX HYD. LIME ALLOWED.
CEMENT MORTAR FILLED INVERT
FLOOR MAY BE 2000 LB. CONCRETE SLAB 6" THICK IN LIEU OF BRICK
BED FIRST COURSE IN CEMENT MORTAR
2 #4's
SEE STANDARD DRWG. NO. 4 FOR FRAME AND GRATE
6"
2'8" MIN.
3/4" FALL
SECTION A-A
SECTION B-B
SCALE ½"=1'0"
STANDARD CATCH BASIN

**Drawing No. 10:**



**Drawing No. 11:**




# SEDIMENT FENCE / STRAW BALE LINE

1 GENERAL DESCRIPTION - TO BE USED DURING THE INSTALLATION OF ALL WATER AND SEWER MAINS ALONG ROAD SHOULDERS OF ANY HIGHWAY ROAD SYSTEM.

2 CONTROL STRUCTURES INDICATED ON PLANS ARE TO BE INSTALLED PRIOR TO ANY DIGGING OR DISRUPTION OF VEGETATION. CONTRACTOR SHALL MAINTAIN ALL ROADSIDE DRAINAGE DITCHES FREE OF SEDIMENT.

3 CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL MEASURES IN A SATISFACTORY MANNER BY REMOVING SEDIMENT OR REPLACING STRUCTURE IF REQUIRED BY RESIDENT INSPECTOR OR STATE AUTHORITIES. OTHER MEASURES MAY BE REQUIRED DEPENDING ON LOCAL WEATHER OR GROUNDWATER CONDITIONS.

4 CONTRACTOR SHALL REMOVE ALL WASTE MATERIAL AND EROSION STRUCTURES FROM PROJECT AFTER COMPLETION OF PROJECT.

5 USE RIP-RAP WHERE REQUIRED ON ANY DISTURBED STREAM BANKS. CONTRACTOR SHALL PLAN WORK SO THAT STOCKPILES OF EARTH ARE NOT SUBJECT TO WASHING INTO ANY STREAM OR DRAINAGE STRUCTURE BY EITHER NORMAL SURFACE DRAINAGE OR FLOODING OF THE STREAM.

6 ALL AREAS NOT TO BE PAVED OR GRAVELED ARE TO BE GRASSED WITHIN 30 DAYS OF BACKFILL AS REQUIRED BY EROSION CONTROL REGULATIONS.

7 BEFORE RESEEDING ANY DISTURBED AREA, CONTACT LANDSCAPE SUPERVISOR, DEPT. OF TRANSPORTATION, DISTRICT OFFICE - ALBEMARLE, N.C. (TELE. 1-704-982-1010)